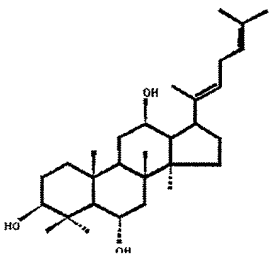
6), δ47.69 (C-7), δ41.48 (C-8), δ50.55 (C-9), δ39.48 (C-10), δ32.02 (C-11), δ72.63 (C-12), δ50.47 (C-13), δ50.73 (C-14), δ32.69 (C-15), δ27.52 (C-16), δ50.92 (C-17), δ17.80 (C-18), δ17.70 (C-19), δ140.11 (C-20), δ13.23 (C-21), δ124.63 (C-22), δ30.04 (C-23), δ78.00 (C-24), δ149.90 (C-25), δ110.54 (C-26), δ17.80 (C-27), δ28.94 (C-28), δ16.56 (C-29) and δ17.14 (C-30).

Sapogenin PBM-110

Dammara-20(22E)-diene-3,6,12-triol (so named as PBM-110)

(1) Structural formula:



PBM-110

(2) Molecular formula: $C_{30}H_{50}O_3$

(3) Molecular weight: 458.722

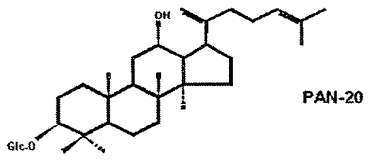
(4) The ^{1}H-NMR spectrum (300 MHz, C_5D_5N) has shown signals at δ5.31 (1H, br.t), δ5.51 (1H, t, J=7.2 Hz), δ2.01 (3H, s), δ1.85 (3H, s), δ1.65 (3H, s), δ1.64 (3H, s), δ1.47 (3H, s), δ1.19 (3H, s), δ1.03 (3H, s) and δ1.01 (3H, s).

(5) The ^{13}C-NMR spectrum (75.4 MHz, C_5D_5N) has shown signals at δ39.48 (C-1), δ27.52 (C-2), δ78.48 (C-3), δ40.42 (C-4), δ61.86 (C-5), δ67.77 (C-6), δ47.69 (C-7), δ41.48 (C-8), δ50.55 (C-9), δ39.48 (C-10), δ32.02 (C-11), δ72.63 (C-12), δ50.47 (C-13), δ50.73 (C-14), δ32.69 (C-15), δ27.52 (C-16), δ50.92 (C-17), δ17.80 (C-18), δ17.70 (C-19), δ140.11 (C-20), δ13.23 (C-21), δ124.63 (C-22), δ30.04 (C-23), δ124.63 (C-24), δ131.33 (C-25), δ25.76 (C-26), δ17.50 (C-27), δ28.94 (C-28), δ16.56 (C-29) and δ17.14 (C-30).

Sapogenin PAN-20

3-O-β-D-glucopyranosyl-dammara-20(21)-diene-3,12-diol (named as PAN-20)

(1) Structural formula:



PAN-20

(2) Molecular formula: $C_{36}H_{60}O_7$

(3) Molecular weight: 604.863

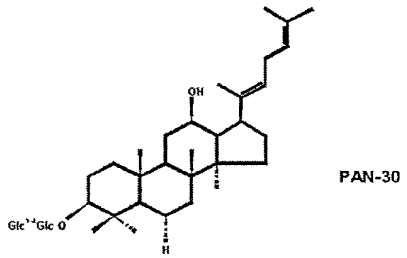
(4) The ^{1}H-NMR spectrum (300 MHz, C_5D_5N) has shown signals at δ4.92 (1H, d, J=7.5 Hz), δ5.29 (1H, br.t), δ5.14 (1H, s), δ4.90 (1H, s), δ1.66 (3H, s), δ1.60 (3H, s), δ1.30 (3H, s), δ1.02 (3H, s), δ0.98 (3H, s), δ0.98 (3H, s) and δ0.81 (3H, s).

(5) The ^{13}C-NMR spectrum (75.4 MHz, C_5D_5N) for aglycon moiety has shown signals at δ39.34 (C-1), δ27.13 (C-2), δ88.82 (C-3), δ40.26 (C-4), δ56.47 (C-5), δ18.52 (C-6), δ35.40 (C-7), δ37.12 (C-8), δ50.91 (C-9), δ39.74 (C-10), δ32.73 (C-11), δ72.47 (C-12), δ48.30 (C-13), δ51.26 (C-14), δ32.74 (C-15), δ26.78 (C-16), δ52.52 (C-17), δ15.86 (C-18), δ16.52 (C-19), δ155.58 (C-20), δ108.19 (C-21), δ33.91 (C-22), δ30.82 (C-23), δ125.39 (C-24), δ131.25 (C-25), δ25.81 (C-26), δ17.81 (C-27), δ28.73 (C-28), δ16.83 (C-29) and δ17.05 (C-30). The ^{13}C-NMR spectrum (75.4 MHz, C5D5N) for 3-glucopyranosyl has shown signals at δ107.00 (C-1"), δ75.82 (C-2"), δ78.79 (C-3"), δ71.94 (C-4"), δ78.39 (C-5") and δ63.14 (C-6").

Sapogenin PAN-30

3-O-[β-D-glucopyranosyl(1→2)-β-D-glucopyranosyl]-dammara-20(22E)-diene-3,12-diol (named as PAN-30)

(1) Structural formula:



PAN-30

(2) Molecular formula: $C_{42}H_{70}O_{12}$

(3) Molecular weight: 766.587

(4) The ^{13}C-NMR spectrum (75.4 MHz, C5D5N) has shown signals at δ39.17 (C-1), δ28.00 (C-2), δ88.82 (C-3), δ40.14 (C-4), δ56.29 (C-5), δ18.33 (C-6), δ35.24 (C-7), δ39.60 (C-8), δ50.66 (C-9), δ36.91 (C-10), δ32.10 (C-11), δ72.49 (C-12), δ50.33 (C-13), δ50.91 (C-14), δ32.54 (C-15), δ26.64 (C-16), δ50.80 (C-17), δ16.35 (C-18), δ16.49 (C-19), δ140.06 (C-20), δ13.07 (C-21), δ123.21 (C-22), δ27.35 (C-23), δ123.54 (C-24), δ131.16 (C-25), δ25.60 (C-26), δ17.66 (C-27), δ28.73 (C-28), δ15.72 (C-29) and δ16.92 (C-30).

[0033] The inventors herein have discovered that the dammarance sapogenin structure that is modified to be specifically clean of any sugar moieties (glycons) at any position and free of hydroxyl at C-20 has surprisingly improved effectiveness in treating cancers, particularly in treating multi-drug resistant cancers, compared to sapogenins that have sugar moieties on the structure or a hydroxyl at C-20 The inventors have unexpectedly found that PAM-120, PBM-110 and PBM-100, which all fall into this chemical category, have greater anti-cancer effect than other known saponins and sapogenins. In particular, these three sapogenins, and especially PAM-120, show surprisingly effective activity in the treatment of multi-drug resistant cancers.